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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/856,561	12/05/2001	Yin-Ming Li	1797-0160001	3573

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1100 New York Avenue NW Suite 600  
Washington, DC 20005-3934

EXAMINER

IBRAHIM, MEDINA AHMED

ART UNIT	PAPER NUMBER
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1638

12

DATE MAILED: 09/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/856,561

Applicant(s)

LI ET AL.

Examiner

Medina A Ibrahim

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-9, 11-13, 16 and 17 is/are rejected.
- 7) ☒ Claim(s) 6, 10, 14 and 15 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Applicant's response filed on 6/23/03 in reply to the Office action mailed on 2/24/03 has been entered. New claim 17 has been added. Therefore, claims 1-17 are pending and are examined. The IDS of 06/23/03 has been considered.

All previous rejections and objections not set forth below have been withdrawn.

#### ***Scope of Enablement***

Claims 1-5, 7-9, 11-13 and 16 are rejected under 35 U.S.C. 112, first paragraph, because the specification is enabling only for claims limited to a method that employs *Thlaspi caerulescens* of G15 genotype that accumulates from about 1000 mg to about 6000 mg of Cd/kg and/or from about 15,000 mg to about 30,000 mg Zn/kg in above ground tissues recovering cadmium and/or zinc from Cd/Zn contaminated soils. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims. This rejection is repeated for the reasons of record as set forth in the last Office action of 02/24/03. Applicant's arguments filed 06/23/03 have been fully considered but are not deemed persuasive.

Applicant argues that the instant specification provides guidance on how to identify suitable genotypes for the claimed method by screening methods known in the prior art. Applicant argues that one of ordinary skill in the art could collect *Thlaspi caerulescens* genotypes, cultivate the plants on areas contaminated with Zn and Cd,

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measure levels of accumulated metals, and identify suitable genotypes. Applicant also argues that specification provides guidance for how to manipulate soil conditions by changing soil pH and addition of fertilizers, metal chelators and chloride salts to increase metal uptake by the plant (response, pages 10-11).

These arguments are not persuasive. The specification disclosed 20 different genotypes of *T. caerulescens* grown on Cd and Zn contaminated soil and hydroponics media. Of the 20 genotypes only the *T. caerulescens* G15 genotype was shown to have the ability to accumulate from 0.1% to 0.6% (6000 ppm) of Cd and/or at least 18,000 mg/kg of Zn in its above ground tissues on dry wt basis (Figs. 1 and 2), without any damage to the plant. The results suggest that not all *T. caerulescens* plants can accumulate the Cd and/or Zn levels as recited in the claims. However, neither the instant specification nor the prior art provides guidance for how to identify the desired genotypes. One skilled in the art would have to test an infinite number of *Thlaspi caerulescens* plants in order to identify and obtain a representative number of genotypes having the desired metal accumulating ability. Such a test is considered excessive and undue. While treatments of soil such as lowering soil pH, adding fertilizers and chelators may improve metal availability to the plant, Salt et al (Biotechnology, vol. 13, pp. 468-474, 1995) disclosed in the last Office action strongly suggest that the ability of a plant to accumulate heavy metals is a genotype dependent and varies greatly between species and between cultivars within the species. Therefore, for the reasons discussed above and in the last Office action of 6/23/03, the claimed invention is not enabled throughout the broad scope. The rejection is maintained.

***Claim Rejections - 35 USC § 102***

Claims 1-4, 7-9, 11-13 and 16 remain rejected under 35 U.S.C. 102(b) as anticipated by Brown et al (Soil Sci. Soc. Am. J. vol. 59:123-133, 1995, Applicant's IDS). This rejection is repeated for the reasons of record as set forth in the last Office action of 02/24/03. Applicant's arguments filed 06/23/03 have been fully considered but are not deemed persuasive.

Applicant argues that Brown et al do not anticipate the claimed invention because all claim limitations are not disclosed by the reference. Applicant asserts that Brown does not teach a method of recovering Cd and Zn from soils by growing *Thlaspi caerulescens* plants on said soil as claimed in claims 1, 9 and 16. Applicant further asserts that Brown teaches a method of recovering metals with *Thlaspi caerulescens* from solution and not from soil (response, pages 12-13).

These arguments are not persuasive. Brown et al teach a method of phytorecovering Cd and Zn from cadmium and zinc-contaminated soil or simulated growth media by growing *Thlaspi caerulescens* plants on said soil or simulated growth media (Cd and Zn are added to the growth media to simulate concentrations often found on contaminated soils (see Methods and Materials on page 126)). While the reference does not explicitly show removal of Cd and Zn from soils, Applicant's own specification (paragraph bridging pages 2 and 3) provides evidence that the teachings by the cited reference include a 2-year field study that resulted in hyperaccumulation of Cd and/or Zn in shoots of *Thlaspi caerulescens* plants. The cited reference further teaches that *T. caerulescens* is an endemic Zn hyperaccumulator (column 2, page 125).

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In addition, the newly submitted reference (Brown et al J. Environ. Qual. 23:1151-1157, 1994), also cited on page 130, column 1 and page 131, column 1, of Brown et al (Soil Sci. Soc. Am. J. vol. 59:123-133, 1995) teaches phytoremediation of Cd and Zn contaminated soils with *T. caerulescens* plant and the hyperaccumulating potential of said plants. Brown et al (J. Environ. Qual. 23:1151-1157, 1994) also teach manipulation of the soil by lowering soil pH with chloride salt to increase mobility and uptake of Zn and Cd (see Materials and Methods on page 1152-1153 and Results on pages 1153-1155). Therefore, all claim limitations are taught by the cited reference. The rejection is maintained.

Claim 5 remains rejected and new claim 17 is rejected under 35 U.S.C. 102(b) as anticipated by Soriano et al (US Pat 4, 326, 884). This rejection is repeated for the reasons of record as set forth in the last Office action of 02/24/03. Applicant's arguments have been considered but are not deemed persuasive.

Applicant argues that Soriano does not anticipate the claimed ores because the prior art ore contains materials other than zinc and cadmium. Applicant further argues that the claimed zinc and/or cadmium containing ore is produced from a plant ash with high grade ore, while the ores of the prior art are not produced by such method (response, pages 14-15).

These arguments are not found persuasive because the claimed ore and the ore taught by Soriano are both zinc and cadmium containing ores. How the zinc and/or cadmium containing ore is produced is not given a patentable weight as evidenced by *In*

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*re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985). Applicants' arguments do not provide clear and convincing evidence that the prior art cadmium and zinc containing ores would not anticipate the claimed invention. The rejection is maintained.

### **Remarks**

Claims 6, 10, 14-15 are free of the prior art because the prior art does not teach or reasonably suggest a method that employs a *T. caerulea* of the G15 genotype nor does the prior art teach isolated *T. caerulea* plants of said genotype.

Claims 6, 10, 14-15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

1. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Papers related to this application may be submitted to Technology Sector 1 by facsimile transmission. Papers should be faxed to Crystal Mall 1, Art Unit 1638, using fax number (703) 308-4242. All Technology Sector 1 fax machines are available to receive transmission 24 hrs/day, 7 days/wk. Please note that the faxing of such papers

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must conform with the Notice published in the Official Gazette, 1096 OG 30 (November 15, 1989).

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Medina A. Ibrahim whose telephone number is (703) 306-5822. The Examiner can normally be reached Monday-Thursday from 8:30AM to 5:30PM and every other Friday from 9:00AM to 5:00PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Dr. Amy Nelson, can be reached at (703) 306-3218.

Any inquiry of a general nature or relating to the status of this application should be directed to the receptionist whose telephone number is (703) 308-0196.

9/17/03

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A handwritten signature in black ink, appearing to read "Amy Nelson", with a stylized, cursive script.

**AMY J. NELSON, PH.D**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 1600**